



US006441981B1

(12) **United States Patent**
Cloke et al.

(10) **Patent No.:** US 6,441,981 B1

(45) **Date of Patent:** *Aug. 27, 2002

(54) **DISK DRIVE INCLUDING A RECORDING SURFACE EMPLOYING SERVO ZONES RECORDED AT A CHANNEL FREQUENCY DIFFERENT FROM DATA ZONES**

(75) **Inventors:** Robert Leslie Cloke, Santa Clara;
Richard William Hull, Laguna Hills;
Vafa James Rakshani, Laguna Beach;
David Price Turner, Los Gatos, all of CA (US)

(73) **Assignee:** Western Digital Technologies, Inc.,
Lake Forest, CA (US)

(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) **Appl. No.:** 09/846,056

(22) **Filed:** May 1, 2001

Related U.S. Application Data

(62) Division of application No. 09/103,674, filed on Jun. 23, 1998, now Pat. No. 6,262,857, which is a continuation of application No. 08/815,352, filed on Mar. 11, 1997.

(51) **Int. Cl.⁷** G11B 5/09; G11B 5/596

(52) **U.S. Cl.** 360/51; 360/48; 360/77.08

(58) **Field of Search** 360/48, 77.08,
360/51, 46

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,016,603 A	4/1977	Ottesen
4,151,571 A	4/1979	Cardot
5,193,034 A	3/1993	Tsuyoshi
5,196,970 A	3/1993	Seko
5,255,136 A	10/1993	Machado
5,384,671 A	1/1995	Fisher
5,796,535 A	8/1998	Tuttle
5,956,196 A *	9/1999	Hull et al. 360/65
6,084,738 A	7/2000	Duffy

* cited by examiner

Primary Examiner—Regina N. Holder

(74) **Attorney, Agent, or Firm**—Milad G Shara

(57) **ABSTRACT**

A disk drive includes a disk having a disk surface, the disk surface having a plurality of tracks arranged in an embedded servo format. The disk surface includes a plurality of radially-extending user-data regions and a plurality of radially-extending servo-data regions. Each user-data region has a plurality of data zones in each of which user data are stored in a plurality of track segments at a data channel frequency particular to that data zone. Each servo-data region has a plurality of servo zones in each of which servo data are stored in a plurality of track segments at a servo channel frequency particular to that servo zone, wherein in at least one of the tracks having servo data and user data, the servo channel frequency differs from the data channel frequency.

18 Claims, 16 Drawing Sheets

